Changes in living arrangement, daily smoking, and risky drinking initiation among young Swiss men: a longitudinal cohort study

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Abstract: OBJECTIVES The aim of this study was to assess the association between changes in living arrangement and the initiation of daily smoking and monthly risky single-occasion drinking (RSOD) in a cohort of young Swiss men. STUDY DESIGN Longitudinal cohort study. METHODS The sample consisted of 4662 young men drawn from the Cohort Study on Substance Use Risk Factors who lived with their family at baseline. Follow-up assessments occurred 15 months later. Multiple regression models were adjusted for individual and family factors (family model), as well as for individual and peer-related factors (peer model). RESULTS Relative to those still living with their parents at follow-up (n = 3845), those who had moved out (n = 817) were considerably more likely to have taken up smoking or RSOD after adjusting for several individual, family, and peer-related variables: OR (daily smoking) = 1.67 (95% CI 1.15-2.41) (P = 0.007) and OR (monthly RSOD) = 1.42 (95% CI 1.08-1.88) (P = 0.012). The strongest family-related predictors of smoking initiation were family structure and the lack of parental regulation and the strongest peer-related factors alcohol/drug problems in peers. Meanwhile, the strongest peer-related predictors of RSOD initiation were peer pressure (misconduct), perceived social support from friends, and perceived social support from a significant other, whereas family factors were not associated with RSOD initiation. Further subanalyses were conducted to examine the impact of different living arrangement changes on substance use initiation and revealed that living with peers at follow-up was associated with the greatest risk. CONCLUSIONS We identified a strong association between moving out of one's parents' home and daily smoking and monthly RSOD initiation in young Swiss men. Moving out to live with peers was an especially strong predictor of substance use initiation. Campaigns that aim to prevent heavy smoking and drinking should be intensified at the end of obligatory school.

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perceived social support from friends, and perceived social support from a significant other, whereas family factors were not associated with RSOD initiation. Further sub-analyses were conducted to examine the impact of different living arrangement changes on substance use initiation, and revealed that living with peers at follow-up was associated with the greatest risk.

Conclusions: We identified a strong association between moving out of one's parents' home and daily smoking and monthly RSOD initiation in young Swiss men. Moving out to live with peers was an especially strong predictor of substance use initiation. Campaigns that aim to prevent heavy smoking and drinking should be intensified at the end of obligatory school.

Keywords

smoking, smoking initiation, risky single-occasion drinking, living arrangement, risk factor

Introduction

The age one starts smoking cigarettes and engaging in risky drinking behaviours is an important determinant of adult smoking and drinking, and the ultimate development of smoking- and alcohol-related diseases.[1-5] Transitioning from adolescence to young adulthood plays a particularly critical role determining health behaviours, as these youths must deal with major changes in their social and occupational environments.[6,7] These changes are accompanied by new social roles and exposure to other, possibly-unhealthy behaviours like substance abuse.[8-11] Environmental and social influences on the health behaviours of adolescents and young adults have been demonstrated among others in twin studies[12] and are now acknowledged widely.

In Switzerland, as in other European countries, the legal age to purchase cigarettes and alcohol (beer, wine) is generally 16. Smoking and alcohol consumption are common among adolescents and young adults. In 2012, more than one-fourth (27.4%) of 20-24 year old men were daily smokers, and 42% of 20-24 year olds, including men and women, were monthly risky single-occasion drinkers.[13] Smoking and risky single-occasion drinking (RSOD) remain more prevalent in young men than women, and both behaviours appear to be increasing over time, especially in young men.[13,14] Twenty-eight percent of Swiss residents started smoking before age 20.[13] Further understanding about why adolescents initiate daily smoking and risky drinking is urgently needed to appropriately direct preventative measures towards those at greatest risk.

Several studies have shown that living arrangements are a strong determinant of smoking and drinking behaviour, especially among youths. In particular, drug use (cigarettes, alcohol, and other drugs) remains relatively stable while youths continue to live with their parents.[9,15] Conversely, living alone, with peers or otherwise separate from parents is associated with increases in risky drinking[16,17] and smoking,[18] even after adjusting for other factors. Potential

reasons include changes in traditional social environments, facilitated access to drugs,[6,10] and less supervision.[19] However, among studies assessing living arrangements and substance use, few were longitudinal, and most were conducted in the US or Canada. Hardly any Swiss data exist. Furthermore, results regarding the influence of family and peer-related factors on daily smoking and risky drinking initiation have been inconsistent.[20-22]

The present study analyses the impact of changes in living arrangement – especially moving out of one's parents' home – and other potentially-influential factors related to family and peers, on the initiation of smoking and risky drinking in young men. Given the dose-response relationship between smoking and smoking-related diseases[23], the stability of heavy versus light/intermittent smoking in early adulthood,[24] and that RSOD appears to be a stronger predictor of negative alcohol-related consequences among young adults than total drinking volume,[25] we focused on daily smoking and monthly RSOD.

Methods

We used data from the Cohort Study on Substance Use Risk Factors (C-SURF), a prospective, ongoing study involving a representative sample of young Swiss men drawn from three army recruitment centres (covering 21/26 Swiss cantons) during their reporting to determine their eligibility for military, civil or no service at age 19, as detailed elsewhere.[26] To date, two data collection waves have been completed: a baseline assessment in 2010 and 2011, and a 1st follow-up assessment a mean 15 months later (mean±SD = 1.29±0.23 years).

Participants

Of 13'245 young men initially seen by C-SURF research staff, 7563 consented to participate in the survey, 5990 (45.2%) completed the baseline questionnaire, and 5223 completed the follow-up questionnaire. Of these, 37 were excluded due to missing data and 524 because they did not live with their parents at baseline. A comparison of participants versus non-participants is published elsewhere.[26]

Measures

Smoking

At baseline and follow-up, participants were asked whether they had smoked cigarettes over the preceding 12 months and, if so, how often. For analysis, responses were dichotomized into less than daily smoker/non-smoker (0) and daily smoker (1). We also adjusted for the number of cigarettes smoked per week at baseline in regression models.

Drinking

Risky single-occasion drinking (RSOD) was defined, per Murgraff et al.[27], as consuming at least six standard drinks (10-12g, containing totalled 60-70g pure alcohol) on a single occasion, which approximates the US measure of 5 or more drinks, given the higher alcohol content of standard drinks (12-14g, containing totalled 60-70g pure alcohol).[28,29] Standard drinks of different types of beverages containing 10-12g pure alcohol were depicted in the questionnaire. Response categories were again dichotomized into no or less than monthly RSOD (0) and at least monthly RSOD (1), though we again adjusted for the baseline weekly number of standard drinks during regression analysis.

Living arrangements

Each subject was asked about their living arrangements at baseline and follow-up, with nine response categories subsequently categorized into five scenarios: living with one's parents; with one or more peers; with a partner; alone; and other (e.g., institutionalized, homeless).

Individual variables

Socio-demographic data collected included age, education, employment status, and marital status. Four different personality traits were included in analysis, all assessed at baseline. The first three — Anxiety/Neuroticism, Aggression/Hostility, and Sociability — were assessed using the Zuckerman-Kuhlmann Personality scale (ZKPQ-50-cc).[30] The fourth trait — Sensation Seeking — was measured using the Brief Sensation Seeking Scale (BSSS).[31] Health-related quality of life (HRQOL) was assessed at follow-up using the 'Medical Outcomes Study 12-Item Short Form Survey (SF12)'.

Family variables

Each parent's highest achieved education, family affluence, and family structure before age 18 (living with both biological parents most of the time (0) or other (1)) were assessed at baseline. As per Miller and Plant,[22] parental rule-setting at age 15 was measured at baseline. Mean scores were dichotomized into a high (≤2) versus low (>2) degree of parental regulation/monitoring). Subjects also were asked whether any first-degree family members had what they would call a 'significant' alcohol or drug problem – one that either led or should have led to treatment.

Peer-related variables

All variables concerning peers were assessed at follow-up. Peer pressure was assessed using the short version of the Peer Pressure Inventory,[32] recently validated in German and French.[33] Only the subscale concerning 'misconduct' was used, however, as only this domain appears to be associated with higher-level substance use.[34] To assess misconduct, participants were asked

to evaluate how strong they perceived their friends' influence was on them regarding six statements (e.g. getting drunk), with responses ranging from -3 (lots of pressure not to do) to +3 (lots of pressure to do). Subjects also were asked whether any of their closest friends had a 'significant' alcohol or drug problem, as defined previously, and about the percentage of their peers currently smoking cigarettes. Finally, perceived social support from friends and a significant other was measured with a previously-published 7-point Likert-type scale of Canty-Mitchell and Zimet.[35] Mean scores were calculated for the four statements on perceived social support from friends and the four statements on perceived social support from a significant other.

Data Analysis

Predictor and outcome variables were compared between those living with versus not living with their parents using t-tests and Pearson χ-square analysis. Binomial tests were performed to identify differences in smoking and drinking between baseline and follow-up. Several logistic regression models were tested to examine the impact of changes in living arrangements (leaving home) on the initiation of daily smoking and monthly RSOD, starting with univariate logistic regression to examine the impact of each factor on the two outcomes. Multiple regression models were first adjusted for individual and family factors (family model) and then for individual and peer-related factors (peer model). A final model included all individual, family and peer-related variables. Interactions between family and peer variables, and between peer variables were analysed. A two-tailed threshold for statistical significance of $p=0.05$ was utilized, using SPSS software (version 21.0).

Results

Participant characteristics

Mean age of the total sample (n=4662) at follow-up was 21.1 (SD=1.1) years. Subject characteristics are summarized in Table 1. Of the 4662 participants living at home at baseline, 3845 (82.5%) had not changed their living arrangement at follow-up, 388 (8.3%) lived with one or more peers, 165 (3.5%) lived with a partner, 214 (4.6%) lived alone, and 50 (1.1%) had some other living arrangement.

Please insert Table 1 here

Initiation of daily smoking

At baseline, 17.5% (817) of the subjects were daily smokers, versus 19.8% (924) at follow-up. Of these 4662, 3611 (77.5%) remained non-daily smokers at follow-up, 234 (5.0%) were daily smokers, 127 (2.7%) stopped smoking daily, and 690 (14.8%) remained daily smokers ($p<0.001$).

On univariate logistic regression, the odds that someone started to smoke daily after moving out of their parent's home was almost double those of someone still living with their parents (crude OR=1.93 [1.42-2.61], $p<0.001$) (Table 2).

Please insert Table 2 here

After adjusting for individual and family variables (Table 2, family model), this effect of moving out of one's parents' home remained significant (adjusted OR=1.81 [1.27-2.58], $p=0.001$), though several other factors also were associated with daily smoking initiation. The most influential factors were sensation seeking, sociability, higher achieved level of education,

number of cigarettes smoked weekly at baseline, lack of parental regulation, and not living with both biological parents.

For the peer model, the adjusted OR for daily smoking initiation in those no longer living with their parents versus those still doing so was 1.69 (1.17-2.42, p=0.005). The only influential peer-related variable was an alcohol/drug problem in at least one close friend. Nevertheless, the influence of peer-related factors was slightly greater than that of family variables. To examine whether the selection of smoking and/or drinking peers was mediated by family factors, comprehensive analysis with interaction terms (family structure*alcohol/drug problem of friends and alcohol/drug problem of family*alcohol/drug problem of friends) was performed; no interaction significantly altered results.

In the final model incorporating individual, family and peer-related variables, the effect of moving out of one's parents' home on the initiation of daily smoking was also reduced (adjusted OR=1.67 [1.15-2.41], p=0.007), but remained significant. In contrast, non-daily smoking was not linked to moving out of one's parents' home (data not shown).

Initiation of monthly risky single-occasion drinking

At baseline, 46.3% (2137/4619) of participants were monthly RSO drinkers versus 44.3% (2047/4619) at follow-up. From baseline to follow-up: 2007 (43.5%) remained non-RSO drinkers, 475 (10.3%) became RSO drinkers, 565 (12.2%) stopped RSOD, and 1572 (34.0%) remained RSO drinkers (p<0.001).

On univariate analysis, the odds of monthly RSOD initiation was higher in those who had moved out of versus remained in their parents' home (crude OR=1.36 [1.06-1.75], p=0.017) (Table 3).

Please insert Table 3 here

For the family model, comparing those no longer living with parents versus their counterparts, the adjusted OR for monthly RSOD initiation was 1.40 (1.07-1.84, p=0.016). The following variables exerted the greatest influence: number of standard drinks consumed weekly at baseline, anxiety/neuroticism, and sociability. Further analysis revealed a protective influence of older age on monthly RSOD initiation. Contrary to the regression model for daily smoking initiation, no family factor (except average versus above-average family income) exhibited any effect in this model once individual variables were considered.

For the peer model, the corresponding adjusted OR was 1.43 (1.09-1.87, p=0.011). Peer-related variables exerted a greater impact than either individual or family variables, the most influential variables being peer pressure (misconduct) and perceived social support from friends. To control for potential selection effects, interactions between family and peer-related variables were analysed, as described above. Again, no significant changes resulted from inclusion of any interaction term.

In the final multiple logistic regression model, adjusted for individual, family and peer-related factors, the OR of monthly RSOD initiation among those no longer versus those still living with parents hardly changed (adjusted OR=1.42 [1.08-1.88], p=0.012).

Health-related quality of life variables, unemployment, and not being in a relationship at follow-up exerted no influence; nor did paternal or maternal level of education. This held true for all regression models on daily smoking initiation and monthly RSOD initiation. The perceived percentage of peers currently smoking cigarettes also exerted no influence.

Sub-analyses assessing changes in living arrangement

To identify changes in living arrangement most likely to influence the initiation of daily smoking or monthly RSOD, the most prevalent arrangements at follow-up were grouped into four categories, with 'no change' (still living with one's parents) as the reference category. The three other categories were living with peers, a partner, and alone.

For daily smoking, crude ORs for moving out to live with peers, a partner, and alone were 1.77 (1.17-2.67, p=0.007), 2.06 (1.11-3.82, p=0.022), and 1.84 (1.06-3.20, p=0.030), respectively. On multiple logistic regression, the adjusted OR for taking up daily smoking was 1.84 (1.15-2.96, p=0.012) for moving out to live with peers, while moving out to live alone or with a partner were no longer significantly associated. However, these results must be interpreted with caution, as the number of participants in each living arrangement category was rather small.

For monthly RSOD, the crude OR was 1.82 (1.29-2.58, p=0.001) for moving out to live with peers, whereas moving out to live with a partner or alone were not significantly associated with a higher risk. After controlling for individual, family and peer-related variables, the OR declined slightly (adjusted OR=1.64 (1.12-2.39, p=0.011), while the ORs for moving out to live with a partner and alone remained unchanged. Again, these results must be interpreted with caution due to low samples.

Discussion

In this survey of 4662 young Swiss men, we identified a strong association between moving out of one's parents' home and the initiation of both daily smoking and monthly risky single-

occasion drinking (RSOD). Relative to those still living with their parents at follow-up, those living elsewhere were considerably more likely to have taken up daily smoking and/or risky drinking. These effects were attenuated, but persistent after adjusting for various individual, family and peer-related variables. These increased odds cannot be explained solely by subjects reaching an age when smoking becomes legal, as cigarette smoking and alcohol consumption is legal from age 16 in Switzerland. Regarding changes in living arrangement, living with peers was the strongest predictor of daily smoking and monthly RSOD initiation on multivariate analysis.

While individual factors explained only a little of the impact of moving out of their parents' home, family factors (especially family structure and absent parental regulation) influenced whether or not subjects started to smoke daily, albeit with little impact upon RSOD. Meanwhile, peer-related characteristics exerted the greatest influence on both behaviours; notably, the presence of an alcohol or drug problem in at least one close friend impacted smoking, and peer pressure and perceived social support affected RSOD.

Our results agree with the previously-identified inhibitory impact of living with parents on both smoking and alcohol consumption initiation in another cohort of comparably-aged (mean=21.5), even after adjusting for life pursuits (school, job, military).[9] They are also consistent with those of a study in which male students living off campus or in residence exhibited a greater risk of alcohol addiction than students living with parents.[36] Likewise, university students not living in their parental home were more likely to be classified as heavy drinkers in Italy[17] and risky alcohol consumers in Spain.[16] Living arrangements appeared to exert no effect upon alcohol intake in a study involving multilevel analysis;[37] however, the cross-sectional design prohibited to examine for changes in living arrangement or the initiation of problematic drinking.

Among parental influences, living with both biological parents was protective against smoking initiation, as previously documented by others.[38,39] Positive parental factors, like parental rule setting and no parental alcohol or drug problems, have been shown to have a lasting positive impact into adulthood.[40] However, family factors exerted no substantial influence on the commencement of risky drinking behaviours in the present study, possibly because parental factors influenced participants' smoking and drinking behaviour indirectly (e.g., parental monitoring impacting adolescent self-esteem, sensation seeking or sociability) and were therefore already included in the regression model amid individual factors. In a review of 87 studies, weak and inconsistent associations between parental and adolescent smoking were identified, with peer smoking exerting a greater effect.[41] In contrast, parental smoking was predictive of the transition from never to daily smoking in longitudinal Dutch[38] and US studies.[21] However, both samples were considerably younger at baseline than ours, and about half their participants were female. Our data revealed a significant and positive relationship between alcohol and drug problems among peers, but not among parents or siblings, and smoking initiation. Nevertheless, comparisons with the above studies must be interpreted with caution, as we did not ask about cigarette use in parents or siblings, looking instead at problematic drug use that did lead or should have led to treatment.

While high-school/university students had greater odds of starting to smoke daily in our study, monthly RSOD initiation was no longer associated with education after adjusting for peer and family factors. This may be interrelated with the protective effect of adult roles and responsibilities (e.g., entering stable employment).[42] The highest achieved level of parental education failed to influence either outcome, consistent with previous studies on youth smoking and drinking.[18,38] Moreover, a recently-published UK birth cohort study only detected a weak

association between hazardous (risky) drinking and socio-economic status, and no association with maternal education.[43]

We failed to identify any association between daily smoking initiation and the family's financial situation, consistent with the results of a recent study involving 52'907 adolescents in the Health Behaviours in School-Aged Children (HBSC) Study,[44] wherein family and school factors explained 100% of the association between family affluence and weekly smoking in boys, with family structure, relationship with parents, and academic achievement as the most important factors. The negative association we detected between RSOD and self-perceived family affluence is consistent with other recently-published findings;[45] but we can only speculate on why perceived family income was not directly associated with RSOD initiation. One potential reason is that a greater proportion of young men with a lower than average family income might have already started binge drinking pre-baseline. Indeed, in Switzerland, the prevalence of RSOD was discovered to decline with increasing age, being highest in 15-20 year olds.[46] However, as only a small proportion of the conscripts considered their family affluence below average, and wage differentials are relatively small in Switzerland, these results must be interpreted warily.

One potential reason that unemployment and not being in a relationship failed to alter either outcome might be that our study subjects were too young to have steady jobs or relationships. However, these findings contrast with one review[47] wherein daily smokers and RSO drinkers were more common among unemployed versus employed subjects, including adolescents and young adults, though most studies reviewed were cross-sectional. In another cross-sectional study, Allem et al.[10] identified an association between losing one's job and smoking over the past 30 days in emerging adults. Our findings were consistent with those identified in a longitudinal study,[15] however, in which the impact on substance use attributable to living

arrangements was generally three times higher than the effects attributable to individual factors like education and employment.

In our study, peer-related factors had a highly-significant impact upon the initiation of both daily smoking and monthly RSOD, consistent with the latest US Surgeon Report, wherein evidence was considered sufficient to confirm a causal relationship between peer group social influences and the initiation and maintenance of smoking during adolescence.[8] Moreover, in a cross-sectional study examining data from the European Schools Project on Alcohol and other Drugs, peer behaviours exhibited the greatest associations with substance use, while the influence of parental monitoring, though significant, was weaker.[22] Present findings also agree with those demonstrating a strong relationship between deviant peers and substance use over the past month,[20] and those identifying peer pressure as one of the factors most strongly influencing RSOD, outweighing parental influences.[48]

Limitations

Our study has several potential limitations. Firstly, all data were self-reported, subjecting them to assessment, recall, and social-desirability bias. Secondly, our data did not include certain other potentially-influential factors, like the duration of participant-peer relationships. Also, many subjects' peer groups may have changed between baseline and follow-up, possibly underestimating peer influence; however, our results remained unchanged when we examined closest friends with or without a significant alcohol or drug problem at baseline and follow-up. More differentiated information on the smoking and drinking behaviours of parents, siblings and peers would have been desirable, but these are difficult to assess accurately. Also, since we only studied young men, we cannot generalize our findings to young women who may have different motives behind smoking initiation than males.[49] Finally, our study's observational design prohibits causal inferences.

Implications for prevention

Numerous studies have demonstrated the high incidences of smoking and problematic alcohol consumption in youths and their association with morbidity and mortality. For example, smoking onset before age 20 is associated with an increased risk of type II diabetes.[4] Adolescents and young adults are uniquely susceptible to social and environmental changes that can influence cigarette and alcohol use, and more vulnerable to addiction and nicotine dependence.[8] Promising intervention programs for smoking exist, especially for youths, that target parent-child communication (+/- additional peer programs).[50,51] Effective intervention programs that deal with peer pressure also exist for students with problematic alcohol consumption.[52] Other interventions shown to reduce substance use include health warnings at the point of consumption and in advertisements,[53] higher prices/taxes,[54-56] and control policies on issues like minimum age of purchase and packaging.[18] Prior analyses have shown that Swiss students who were financially dependent more frequently bought alcoholic beverages at off-premise locations due to their limited financial resources.[57] Therefore, price regulations may be especially effective if they reduce the price spectrum at its lowest.[55,56] However, in an international survey on tobacco controls, Switzerland only ranked 18th out of 34 countries in 2013, and failed to achieve half of the possible 100 available rating points;[58] two weaknesses identified were weak tobacco advertising legislation, and inadequate pricing and taxing of tobacco products.[58] Almost 90% of US adults claim they would not start smoking if they could do it all over again.[59] To increase our understanding of the impact changes in living arrangements have on daily smoking and risky drinking initiation, further research with longer follow-up is needed, especially focussing on concurrent smoking and alcohol consumption.[60]

Conclusions

We have identified a strong association between moving out of one's parents' home and daily smoking and monthly RSOD initiation in young Swiss men, after controlling for several individual, family and peer-related factors. Moving out to live with peers was an especially strong predictor.

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Ethical approval

The study's protocol was approved by the Ethics Committee for Clinical Research at Lausanne University Medical School (Protocol No. 15/07).

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Competing interests

None declared.

Authors' contributions

GG and MMK designed the study and protocol. CB and MMK conceptualized the manuscript. CB analyzed the data and wrote the first draft of this manuscript. MD, SF and NE assisted in data analyses. GG made major contributions to the content of the manuscript. All authors contributed to manuscript writing and approved the final manuscript.

References

1. Planas A, Clara A, Marrugat J, Pou JM, Gasol A, de Moner A, et al. Age at onset of smoking is an independent risk factor in peripheral artery disease development. *J Vasc Surg* 2002;35(3):506-9.
2. Ezzati M, Lopez AD, Rodgers A, Vander Hoorn S, Murray CJ. Selected major risk factors and global and regional burden of disease. *Lancet* 2002;360(9343):1347-60.
3. Jha P, Peto R. Global effects of smoking, of quitting, and of taxing tobacco. *N Engl J Med* 2014;370(1):60-8.
4. Kim SJ, Jee SH, Nam JM, Cho WH, Kim JH, Park EC. Do early onset and pack-years of smoking increase risk of type II diabetes? *BMC Public Health* 2014;14(1):178.
5. Rehm J, Taylor B, Room R. Global burden of disease from alcohol, illicit drugs and tobacco. *Drug Alcohol Rev* 2006;25(6):503-13.
6. Kuntsche E, Gmel G. Alcohol consumption in late adolescence and early adulthood - where is the problem? *Swiss Med Wkly* 2013;143:w13826.
7. Brooks JH, DuBois DL. Individual and environmental predictors of adjustment during the first year of college. *Journal of College Student Development* 1995;36(4):347-60.
8. Department of Health and Human Services. *Preventing tobacco use among youth and young adults: a report of the Surgeon General.* Available at

http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/#Full%20Report; 2012 (last accessed 12/12/2015)

9. Newcomb M, Bentler P. Changes in drug use from high school to young adulthood: effects of living arrangement and curent life pursuit. *Journal of Applied Developmental Psychology* 1987;8:221-46.

10. Allem JP, Soto DW, Baezconde-Garbanati L, Unger JB. Role transitions in emerging adulthood are associated with smoking among Hispanics in Southern California. *Nicotine Tob Res* 2013;15(11):1948-51.

11. Baha M, Le Faou AL. Smokers' reasons for quitting in an anti-smoking social context. *Public Health* 2010;124(4):225-31.

12. Rende R, Slomkowski C, McCaffery J, Lloyd-Richardson EE, Niaura R. A twin-sibling study of tobacco use in adolescence: etiology of individual differences and extreme scores. *Nicotine Tob Res* 2005;7(3):413-9.

13. Gmel G, Kuendig H, Notari L, Gmel C, Flury R. *Suchtmonitoring Schweiz - Konsum von Alkohol, Tabak und illegalen Drogen in der Schweiz im Jahr 2012 [Addiction monitoring Switzerland - consumption of alcohol, tobacco and illicit drugs in Switzerland in the year 2012]*. Lausanne; 2013.

14. Bundesamt für Statisitk [Swiss Federal Statistical Office]. *Tabakkonsum nach Alter, Geschlecht, Sprachregion und Bildungsniveau [Tobacco consumtion according to age, sex, linguistic region and level of education].* Available at http://www.bfs.admin.ch/bfs/portal/de/index/themen/14/02/02/key/03.html; 2013 (last accessed 03/06/2015).

15. Bachman JG, O'Malley PM, Johnston LD. Drug use among young adults: the impacts of role status and social environment. *J Pers Soc Psychol* 1984;47(3):629-45.

16. Caamano-Isorna F, Corral M, Parada M, Cadaveira F. Factors associated with risky consumption and heavy episodic drinking among Spanish university students. *Journal Stud Alcohol Drugs* 2008;69(2):308-12.

17. D'Alessio M, Baiocco R, Laghi F. The problem of binge drinking among Italian university students: a preliminary investigation. *Addict Behav* 2006;31(12):2328-33.
18. Powell LM, Tauras JA, Ross H. The importance of peer effects, cigarette prices and tobacco control policies for youth smoking behavior. *J Health Econ* 2005;24(5):950-68.
19. Wicki M, Kuntsche E, Gmel G. Drinking at European universities? A review of students' alcohol use. *Addict Behav* 2010;35(11):913-24.
20. Eitle D. The moderating effects of peer substance use on the family structure-adolescent substance use association: quantity versus quality of parenting. *Addict Behav* 2005;30(5):963-80.
21. Bricker JB, Peterson AV, Jr., Sarason IG, Andersen MR, Rajan KB. Changes in the influence of parents' and close friends' smoking on adolescent smoking transitions. *Addict Behav* 2007;32(4):740-57.
22. Miller P, Plant M. The family, peer influences and substance use among UK teenagers. *Journal of Substance Use* 2003;8:19-26.
23. Teo KK, Ounpuu S, Hawken S, Pandey MR, Valentin V, Hunt D, et al. Tobacco use and risk of myocardial infarction in 52 countries in the INTERHEART study: a case-control study. *Lancet* 2006;368(9536):647-58.
24. White HR, Bray BC, Fleming CB, Catalano RF. Transitions into and out of light and intermittent smoking during emerging adulthood. *Nicotine Tob Res* 2009;11(2):211-9.
25. Astudillo M, Kuntsche S, Graham K, Gmel G. The influence of drinking pattern, at individual and aggregate levels, on alcohol-related negative consequences. *Eur Addict Res* 2010;16(3):115-23.
26. Studer J, Baggio S, Mohler-Kuo M, Dermota P, Gaume J, Bertholet N. Examining non-response bias in substance use research: Are late respondents proxies for non-respondents. *Drug Alcohol Depend* 2013;132:316-23.

27. Murgraff V, Parrott A, Bennett P. Risky single-occasion drinking amongst young people--definition, correlates, policy, and intervention: a broad overview of research findings. *Alcohol Alcohol* 1999;34(1):3-14.

28. Babor T, Higgins Biddle J, Saunders J, Monteiro M. *AUDIT: the Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*. Geneva: World Health Organization; 2001.

29. Gmel G, Rehm J, Kuntsche E. Binge drinking in Europe: Definitions, epidemiology, and consequences. *Sucht* 2003;49(2):105-16.

30. Aluja A, Rossier J, García L, Angleitner A, Kuhlman M, Zuckerman M. A cross-cultural shortened form of the ZKPQ (ZKPQ-50-cc) adapted to English, French, German, and Spanish languages. *Personality and Individual Differences* 2006;41(4):619–28.

31. Hoyle R, Stephenson M, Palmgreen P, Lorch E, Donohew R. Reliability and validity of a brief measure of sensation seeking. *Personality and Individual Differences* 2002;32(3):401–14.

32. Brown BB, Clasen DR, Eicher SA. Perceptions of Peer Pressure, Peer Conformity Dispositions, and Self-Reported Behavior among Adolescents. *Developmental Psychology* 1986;22(4):521-30.

33. Baggio S, Studer J, Daeppen J, Gmel G. Adaptation en français et en allemand d'une échelle de pression des pairs pour jeunes adultes: le Peer Pressure Inventory [Adaptation of a peer pressure scale in French and German: the Peer Pressure Inventory]. *Revue d'Épidemiologie et de Santé Publique* 2013;61:241-52.

34. Studer J, Baggio S, N'Goran A, Deline S, Henchoz Y, Mohler-Kuo M, et al. Peer pressure and alcohol use in young men: A mediation analysis of drinking motives. *Int J Drug Policy* 2014;25(4):700-8.

35. Canty-Mitchell J, Zimet GD. Psychometric properties of the Multidimensional Scale of Perceived Social Support in urban adolescents. *Am J Community Psychol* 2000;28(3):391-400.

36. Valliant P, Scanlan P. Personality, living arrangements, and alcohol. *Social Behavior and Personality* 1996;24(2):151-6.

37. Demers A, Kairouz S, Adlaf EM, Gliksman L, Newton-Taylor B, Marchand A. Multilevel analysis of situational drinking among Canadian undergraduates. *Soc Sci Med* 2002;55(3):415-24.

38. Otten R, Engels RC, van de Ven MO, Bricker JB. Parental smoking and adolescent smoking stages: the role of parents' current and former smoking, and family structure. *J Behav Med* 2007;30(2):143-54.

39. Griesbach D, Amos A, Currie C. Adolescent smoking and family structure in Europe. *Soc Sci Med* 2003;56(1):41-52.

40. Neighbors C, Lee CM, Lewis MA, Fossos N, Larimer ME. Are social norms the best predictor of outcomes among heavy-drinking college students? *J Stud Alcohol Drugs* 2007;68(4):556-65.

41. Avenevoli S, Merikangas KR. Familial influences on adolescent smoking. *Addiction* 2003;98 Suppl 1:1-20.

42. Bachman JG, O'Malley HM, Schulenberg JE, Johnston LD, Bryant AL, Merline AC. *The Decline of Substance Use in Young Adulthood: Changes in social Activities, Roles, and Beliefs.* Mahwah, NJ: Lawrence Erlbaum; 2002

43. Kipping RR, Smith M, Heron J, Hickman M, Campbell R. Multiple risk behaviour in adolescence and socio-economic status: findings from a UK birth cohort. *Eur J Public Health* 2015;25(1):44-9.

44. Moor I, Rathmann K, Lenzi M, Pförtner TK, Nagelhout GE, de Looze M, Bendtsen P, Willemsen M, Kannas L, Kunst AE, Richter M. Socioeconomic inequalities in

adolescent smoking across 35 countries: a multilevel analysis of the role of family, school and peers. *Eur J Public Health* 2015;25(3):457-63.

45. Steiner S, Schori D, Gmel G. Excessive alcohol consumption in young men: is there an association with their earlier family situation? *Swiss Med Wkly* 2014;144:w14007.

46. Gmel G, Kuntsche E, Rehm J. Risky single-occasion drinking: bingeing is not bingeing. *Addiction* 2011;106:1037-45.

47. Henkel D. Unemployment and substance use: a review of the literature (1990-2010). *Curr Drug Abuse Rev* 2011;4(1):4-27.

48. Kuntsche E, Rehm J, Gmel G. Characteristics of binge drinkers in Europe. *Soc Sci Med* 2004;59(1):113-27.

49. Okoli C, Greaves L, Fagyas V. Sex differences in smoking initiation among children and adolescents. *Public Health* 2013;127(1):3-10.

50. Turrisi R, Larimer ME, Mallett KA, Kilmer JR, Ray AE, Mastroleo NR, et al. A randomized clinical trial evaluating a combined alcohol intervention for high-risk college students. *J Stud Alcohol Drugs* 2009;70(4):555-67.

51. Turrisi R, Abar C, Mallett KA, Jaccard J. An Examination of the Mediational Effects of Cognitive and Attitudinal Factors of a Parent Intervention to Reduce College Drinking. *J Appl Soc Psychol* 2010;40(10):2500-26.

52. Cronce JM, Larimer ME. Individual-focused approaches to the prevention of college student drinking. *Alcohol Res Health* 2011;34(2):210-21.

53. Boluarte TA, Mossialos E, Rudisill C. The impact of alcohol policies across Europe on young adults' perceptions of alcohol risks. *CESifo Economic Studies* 2011;57(4)763-88.

54. Wagenaar AC, Salois MJ, Komro KA. Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction* 2009;104:179-90.

55. Stockwell T, Auld MC, Zhao J, Martin G. Does minimum pricing reduce alcohol consumption? The experience of a Canadian province. *Addiction* 2012; 107:912-20

56. Gruenewald PJ, Ponicki WR, Holder HD, Romelsjo A. Alcohol prices, beverage quality, and the demand for alcohol: quality substitutions and price elasticities. *Alcohol Clin Exp Res* 2006;30:96-105.

57. Foster S, Gmel G, Dey M, Studer J, Mohler-Kuo M. The interplay between educational tracks, financial resources, and drinking locations: a cross-sectional mediation analysis in young Swiss men. Epidemiology, Biostatistics and Prevention Institute, University of Zurich, Switzerland. Forthcoming 2016.

58. Joossens L, Raw M, editors. The Tobacco Control Scale 2013 in Europe [Internet]. Brussels, Belgium: Association of European Cancer Leagues; 2014 [cited 2016 Apr 16]. Available from: http://www.europeancancerleagues.org/images/TobaccoControl/TCS_2013_in_Europe_13-03-14_final_1.pdf

59. Winickoff JP, Gottlieb M, Mello MM. Tobacco 21--an idea whose time has come. *N Engl J Med* 2014;370(4):295-7.

60. Hoek J, Maubach N, Stevenson R, Gendall P, Edwards R. Social smokers' management of conflicted identities. *Tob Control* 2013;22(4):261-5.

Table 1: Characteristics of participants by change of living arrangement

	No change (n=3845)	Moving out (n=817)	p-value
Age at baseline: mean (SD)	19.8 (1.0)	20.0 (1.2)	<0.001
Age at follow-up: mean (SD)	21.1 (1.1)	21.3 (1.2)	<0.001
Personality traits[a]			
Sensation seeking: mean (SD)	3.0 (0.9)	3.2 (0.9)	<0.001
Anxiety / Neuroticism: mean (SD)	2.0 (2.0)	2.0 (2.0)	0.860
Aggression / Hostility: mean (SD)	4.1 (2.2)	4.2 (2.2)	0.349
Sociability: mean (SD)	5.9 (2.2)	6.0 (2.2)	0.138
Education[a]			0.001
primary school: n (%)	337 (8.9)	44 (5.5)	
higher vocational school: n (%)	1683 (44.5)	343 (43.0)	
high school/university: n (%)	1761 (46.6)	411 (51.5)	
Number of cigarettes per week (at baseline)[a]: mean (SD)	0.0 (0.0-5.5)	0.1 (0.0-28.0)	<0.001
Number of standard drinks per week (at baseline)[a]: mean (SD)	5.0 (0.0-13.0)	5.0 (0.0-16.0)	0.011
Parental rule setting[a]			
lack of parental regulation: n (%)	1535 (40.1)	327 (40.2)	0.952
lack of parental monitoring: n (%)	913 (24.1)	219 (27.2)	0.063
Family structure[a]			
not living with both biological parents: n (%)	709 (18.7)	194 (24.1)	<0.001
Alcohol/drug problem in 1st degree family member[a]: n (%)	293 (7.9)	74 (9.3)	0.204
Family affluence			0.288
above average income: n (%)	1730 (45.0)	373 (45.7)	
average income: n (%)	1621 (42.2)	325 (39.8)	
below average income: n (%)	494 (12.8)	119 (14.6)	
Perceived social support[a]			
- from friends: mean (SD)	6.0 (5.5-6.8)	6.0 (5.5-6.8)	0.650
- from a significant other: mean (SD)	6.3 (5.5-7.0)	6.5 (5.5-7.0)	0.496
Peer pressure (misconduct) [a]: mean (SD)	0.0 (-0.2-0.3)	0.0 (0.0-0.5)	0.125
Alcohol/drug problem in at least one close friend[a]: n (%)	1415 (37.0)	340 (41.9)	0.010

[a] n varied slightly due to missing data

Table 2: Logistic regression models predicting daily smoking initiation.

	Daily smoking initiation			
	Univariate model Crude OR [95% CI]	Family model AOR[a] [95% CI]	Peer model AOR[a] [95% CI]	Full model AOR[a] [95% CI]
Moving out of parents' home	1.93 [1.42-2.61]**	1.81 [1.27-2.58] **	1.69 [1.17-2.42]**	1.67 [1.15-2.41]**
Age	1.04 [0.92-1.17]	0.98 [0.85-1.14]	0.97 [0.84-1.12]	0.98 [0.84-1.14]
Personality traits				
sensation seeking	1.57 [1.33-1.85]**	1.35 [1.12-1.64]**	1.30 [1.07-1.57]**	1.32 [1.09-1.61]**
anxiety / neuroticism	1.01 [0.95-1.09]	1.02 [0.94-1.10]	1.03 [0.95-1.12]	1.02 [0.94-1.11]
aggression / hostility	1.15 [1.09-1.22]**	1.05 [0.98-1.13]	1.03 [0.96-1.10]	1.04 [0.96-1.12]
sociability	1.15 [1.08-1.22]**	1.13 [1.04-1.22]**	1.12 [1.04-1.21]**	1.13 [1.04-1.23]**
Education				
primary school	1.00	1.00	1.00	1.00
higher vocational school	2.62 [1.68-4.11]**	1.79 [1.02-3.14]*	1.93 [1.10-3.37]*	1.67 [0.92-3.00]
high school / university	1.81 [1.36-2.42]**	1.57 [1.13-2.18]**	1.71 [1.24-2.38]**	1.60 [1.14-2.23]**
Number of cigarettes per week (at baseline)	1.07 [1.06-1.07]**	1.06 [1.05-1.07]**	1.06 [1.05-1.07]**	1.06 [1.05-1.07]**
Parental rule setting				
lack of parental regulation	1.43 [1.09-1.86]**	1.53 [1.12-2.09]**		1.59 [1.16-2.19]**
lack of parental monitoring	1.38 [1.02-1.86]*	0.79 [0.54-1.14]		0.78 [0.54-1.14]
Family structure (not living with both biological parents)	1.85 [1.37-2.50]**	1.53 [1.07-2.18]*		1.47 [1.02-2.12]*
Alcohol/drug problem in 1st degree family member	1.44 [0.89-2.33]	0.96 [0.52-1.76]		0.94 [0.51-1.73]
Family affluence				
above average income	1.00	1.00		1.00
average income	1.10 [0.70-1.72]	1.20 [0.70-2.03]		1.18 [0.69-2.01]
below average income	1.24 [0.79-1.94]	1.44 [0.86-2.41]		1.44 [0.85-2.43]
Perceived social support				
- from friends	0.96 [0.87-1.07]		1.04 [0.88-1.23]	1.06 [0.89-1.26]
- from a significant other	0.96 [0.88-1.05]		0.93 [0.80-1.07]	0.96 [0.80-1.07]
Peer Pressure (misconduct)	1.58 [1.25-1.99]**		1.23 [0.95-1.60]	1.15 [0.88-1.51]
Alcohol/drug problem in at least one close friend	2.04 [1.56-2.67]**		1.61 [1.18-2.20]**	1.67 [1.21-2.29]**

Note: [a] AOR = adjusted odds ratio; * $p<0.05$; ** $p<0.01$

Table 3: Logistic regression models predicting risky single occasion drinking (RSOD) initiation.

	Monthly RSOD initiation			
	Univariate model Crude OR [95% CI]	Family model AOR[a] [95% CI]	Peer model AOR[a] [95% CI]	Full model AOR[a] [95% CI]
Moving out of parents' home	1.36 [1.06-1.75]*	1.40 [1.07-1.84]*	1.43 [1.09-1.87]*	1.42 [1.08-1.88]*
Age	0.83 [0.76-0.92]**	0.83 [0.74-0.92]**	0.81 [0.73-0.90]**	0.82 [0.74-0.91]**
Personality traits				
sensation seeking	1.33 [1.18-1.50]**	1.15 [1.01-1.31]*	1.14 [1.00-1.30]*	1.14 [1.00-1.30]
anxiety / neuroticism	1.04 [0.99-1.10]	1.10 [1.04-1.16]**	1.09 [1.03-1.15]**	1.10 [1.04-1.16]**
aggression / hostility	1.04 [0.99-1.09]	1.01 [0.96-1.06]	1.01 [0.96-1.06]	1.00 [0.95-1.06]
sociability	1.09 [1.05-1.14]**	1.09 [1.03-1.14]**	1.10 [1.04-1.15]**	1.09 [1.04-1.15]**
Education				
primary school	1.00	1.00	1.00	1.00
higher vocational school	0.67 [0.44-1.00]	0.72 [0.46-1.12]	0.64 [0.41-1.00]	0.66 [0.42-1.06]
high school / university	0.96 [0.78-1.19]	1.00 [0.80-1.26]	0.99 [0.79-1.25]	1.03 [0.82-1.30]
Number of standard drinks per week (at baseline)	1.08 [1.06-1.09]**	1.07 [1.05-1.09]**	1.07 [1.05-1.09]**	1.07 [1.05-1.09]**
Parental rule setting				
lack of parental regulation	0.94 [0.76-1.15]	0.95 [0.75-1.19]		0.96 [0.76-1.20]
lack of parental monitoring	1.12 [0.88-1.42]	1.02 [0.78-1.35]		0.95 [0.72-1.26]
Family structure (not living with both biological parents)	1.14 [0.90-1.46]	1.30 [0.99-1.69]		1.22 [0.92-1.60]
Alcohol/drug problem in 1st degree family member	0.78 [0.51-1.18]	0.85 [0.55-1.33]		0.86 [0.55-1.35]
Family affluence				
above average income	1.00	1.00		1.00
average income	1.81 [1.29-2.54]**	1.67 [1.17-2.40]**		1.66 [1.15-2.40]**
below average income	1.42 [1.01-2.00]*	1.32 [0.92-1.90]		1.33 [0.92-1.93]
Perceived social support				
- from friends	1.11 [1.02-1.21]*		1.16 [1.03-1.32]*	1.16 [1.03-1.32]*
- from a significant other	1.00 [0.94-1.08]		0.91 [0.82-1.00]	0.89 [0.81-0.99]*
Peer Pressure (misconduct)	1.44 [1.22-1.72]**		1.36 [1.13-1.63]**	1.32 [1.10-1.59]**
Alcohol/drug problem in at least one close friend	1.28 [1.04-1.58]*		1.23 [0.98-1.55]	1.22 [0.96-1.54]

Note: [a] AOR = adjusted odds ratio; * $p<0.05$; ** $p<0.01$